

CLAIMS

1. A solar cell, comprising:
a conductive substrate; and
5 an insulating layer, a conducting layer and a semiconductor layer
that are disposed on the substrate in this order,
wherein a through hole is formed so as to penetrate the insulating
layer and the conducting layer, and
the through hole is filled with a semiconductor that composes the
10 semiconductor layer.
2. A solar cell, comprising:
a conductive substrate;
an insulating layer formed on the substrate; and
15 a plurality of unit cells that are formed on the insulating layer and
are connected in series,
wherein each unit cell comprises a conducting layer and a
semiconductor layer that are disposed on the insulating layer in this order,
a through hole is formed so as to penetrate the insulating layer and
20 the conducting layer, and
the through hole is filled with a semiconductor that composes the
semiconductor layer.
3. The solar cell according to claim 1 or 2, wherein at least one element
25 selected from the elements composing the substrate diffuses into the
semiconductor with which the through hole is filled.
4. The solar cell according to any one of claims 1 to 3, wherein the
substrate is made of a metal alloy comprising at least two elements selected
30 from Ti, Cr, Fe and Ni, or stainless steel.
5. The solar cell according to any one of claims 1 to 4, wherein the
insulating layer is made of at least one selected from the group consisting of
SiO₂, TiO₂, Al₂O₃, Si₃N₄, TiN and glass.
35
6. The solar cell according to any one of claims 1 to 5, wherein the
conducting layer comprises Mo.

7. The solar cell according to any one of claims 1 to 6, wherein the semiconductor layer is made of a compound semiconductor comprising an element from group Ib, an element from group IIIb, and an element from group VIb.
8. The solar cell according to claim 7, wherein the element from group Ib is Cu, the element from group IIIb is at least one element selected from In and Ga, and the element from group VIb is at least one element selected from Se and S.
9. The solar cell according to claim 8, wherein the compound semiconductor is a p-type semiconductor, and the semiconductor with which the through hole is filled is a p-type or n-type semiconductor having higher resistance than the p-type semiconductor of the compound semiconductor.
10. A method for manufacturing a solar cell comprising a conductive substrate, and an insulating layer, a conducting layer and semiconductor layer that are disposed on the substrate in this order, comprising the steps of:
- (i) laminating the insulating layer and the conducting layer on the substrate in this order;
 - (ii) forming a through hole so as to penetrate the insulating layer and the conducting layer; and
 - (iii) forming the semiconductor layer in the through hole and over the conducting layer.
11. The method for manufacturing a solar cell according to claim 10, wherein in the step (ii) the through hole is formed by letting electric current flow between the conducting layer and the substrate.
12. The method for manufacturing a solar cell according to claim 10, further comprising a step of removing a part of the conducting layer to be in a strip shape, so that the conducting layer is split off into plural strips, which is conducted after the step (i) and before the step (ii),

wherein in the step (ii) the through hole is formed by letting electric current flow between two conducting layers selected from the plural strips of the conducting layers.